

Tape A  
Side 1

## The Water System

When a farmstead was first established, one of the very first things necessary was to obtain a source of water. Of course there were many different situations and intern, often different alternatives and possibilities.

The importance of water on the farm is clear, for without water there could be no crops, no livestock, no farm and no people. Life depends on water, on the proper quantity and quality and on it's availability at the necessary time.

Throughout most of the country there is plenty of good water quite near the plants, animals and humans whose life depends upon it. But it is generally underground, and not readily available. The big problem is to bring it up and distribute it where it will do the most good. That is the job of the water system.

### Source of Water

Usually it was necessary to dig a well if there was not water available. Even this provided a wide variety of circumstances and situations because of the availability of an underground water supply, how deep it was, how far from the house, the kind of soil and or rock formation in which the well had to be dug.

If the well was shallow and no pump was available, the water was lifted with a bucket, "the old oaker bucket" situation. If a pump was available it might have been a "pitcher" pump or one that could be connected to a pipe line.

As the years slid by and electric lines were extended out into the country, the farmers innovated to develop their own water system. Looking at the neighbors and reading publications, they made adaption to their situation.





There were many stories told about how the farmer developed his water system and how that farmer made use of the old pump or the spring on the hill. When electricity came there were many questions about how <sup>to instal a water system, and how</sup> much will a water system cost. We think those stories are *interesting* and we would like to share some with you.

There is hardly an investment about the farm that will yield such large returns in time and labor saving, in convenience, in comfort, and often in dollars and cents. <sup>start to pe</sup> Back in the twenties, if there ever was a man that innovated a water system it was Joe Matthews up in Eagle Heights, Wisconsin. Mr. Matthews early decided that water under pressure at the faucets in his kitchen and barns would do more for comfortable living than all the rippling blue of Mendota.

For the first water system, he used an old fashioned <sup>force</sup> ~~horse~~ pump having an ordinary windmill head. The power was supplied by the windmill, but there was also a open, spur geared pump jack and a gas engine for calm days.

The well was about 35 feet from the house. The water was pumped to a 350 gallon <sup>hydro-pneumatic</sup> ~~hydro~~ramatic pressure tank in the basement, but his tank supplied water to the house only; there was no connection between it and the barns. At a point below the frost line the pump had a valve which could be turned one way to force the water through an underground pipe into the pressure tank, and another way to bring it to the top of the ground where it discharged into a large open concrete keg near the windmill.

Because it was on a higher spot than the barns, the ground sloped away from it in every direction - this tank served as a reservoir from which the water flowed by gravity through underground pipes to a small stock tank in the barn and to two other tanks in the field. Each of these was set in a partitioned fence so as to be accessible from two pastures. Since these outdoor tanks were not used in the winter they were filled by means of valves at the open concrete reservoir near the pump, and the pipes were so made that they would drain when the valves





were closed. The tank in the barn was most useful in the winter and the pipe supplying it was buried below the frost line. For convenience the valve controlling this supply was at the tank in the barn.

Though the pipe was well buried and the tank and valve were safe in the barn, there was a weak point in the system. That was the concrete tank out there in the open. It had to be heated all winter long to keep the water flowing.

### A Change is Made

After years of use an air pump supplying air to the ~~hydramatic pump~~ <sup>hydro-pneumatic tank</sup> ceased to operate, and the tank became water logged. As Mr. Matthews expressed it, "we couldn't get near as much water in the tank as we use to."

That was the way it seemed, of course. But that was not really true. The tank was so nearly full all the time that only a little could be added, and the remaining air could only force a little water out of the faucets. The system had other limitations. The windmill and gas engine were rather uncertain sources of power, and the continual stocking of the tank through winter took a lot of time.

Then came the electric line. Mr. Matthews was eager for the convenience of electric power and decided to fix<sup>x</sup> up his old water system. The local implement dealer got out his catalogs and recommended a <sup>new pump jack</sup> with a gear ratio suitable for electric motor drive. The only make he knew about was big and clumsy and depended on a few shallow oil holes for lubrication. He knew something about Mr. Matthews well and the old gas engine so to be sure he had plenty of power he recommended a two horse power motor. The price was <sup>0</sup>quited at \$200.

Naturally this looked big to Mr. Matthews, so he decided to think it over a while.

A few days later his son brought his instructor in agriculture <sup>at high school</sup> to the ~~store~~

<sup>home</sup> with him to look over his farm project. The man stopped to chat a while with





Mr. Matthews himself. Now that you have electricity can't we fix up a completely automatic pumping system? Yes, I have figured on putting a two horse power motor on that pump. "Why get such a big one?" "The dealer said I need it because of the deep well."

### *Designing the System*

Of course the hole may be drilled deep but how far is it to water, that is the important thing. Oh, it's only about 80 feet to the water. You ~~have~~ <sup>haven't</sup> more than 30 head of livestock altogether haven't you? You really do not need more than 300 gallons per ~~year~~ <sup>hour</sup>. A 3/4 horse power motor is plenty big enough to lift that much water 80 feet and put a lot of pressure behind it too. Now for that outdoor location you had better chose an entirely different ~~enclosed shaft~~ <sup>Jack, driven</sup> by gears or chain. If this is going to be an automatic job you want it to be off your mind altogether. It should be thoroughly lubricated by supply of oil from the housing so you don't have to go out there and stoop down and fill grease cups every day. Besides if you use a belt driven outfit you will have to build some kind of shelter over it. A good automatic outfit with a tank will cost around \$150. That sounds good to me, said Mr. Matthews. But the thing that would save most work would be an electrical heater of some kind to keep that big tank and the well from freezing solid. In heavens name why, shouted the teacher, you don't use that tank in the winter do you? Sure do, how else would we get water to the barn.

Then he explained that by the old system he must pump into the tank on the top of the hill before he could get it to the pipe that carried it to the barn.

Then the agriculture instructor, always eager to be of service to the farmers in the district, got busy ~~and~~ <sup>in real earnest.</sup> Together they planned and put in such improvements to the old system as made the new installation a model.

### Enlarge the Pit

First they enlarged the pit ~~of~~ <sup>or</sup> dry well around the pumo so that when ~~the~~





walls<sup>ed</sup> and floor<sup>ed with</sup> were concrete it was fully 5 feet square and 7 feet deep.

The metal casing that lined the drill hole extended several inches above the floor so around the casing and flush with the top they poured a solid concrete foundation for the new electric pump jack. At the corner of the pit they provided vertical draining by sinking two or three lengths of tile and filling them with coarse gravel. This carries off any water that may collect in the pit.

#### New Pumping Unit Installed

Down in this pit, where it never freezes, they installed a brand new pumping unit. The system included a totally enclosed gear driven jack with the motor built into it and closely coupled to a short and sturdy pumping head not at all like the common windmill pump. They chose a brass cylinder of 2-1/4" diameter and equipped with bronze spring valves which act more quickly and positively than ordinary valves. While they were about it they put in ~~the~~ new drop pipe because it practically floats in the pipe and is easier and quieter to operate, they decided on a wooden pump rod.

The whole outfit is connected so that it takes the place of the old pump by pumping directly into the 350 gallon pressure tank in the house cellar. It includes an air pump that keeps enough air in the tank to provide good pressure and capacity. To provide for the barn they dug down to the old supply pipe, cut it off, and reconnected it to a T in the line from the barn to the house.

At first Mr. Matthews had some trouble with this pipe to the barn. If he opened the faucet while horses were drinking, a mixture of air and water would rush out and scare the horses that were drinking. He found that where the barn pipe left the T in the well <sup>Pit,</sup> it sloped up a short distance, allowing some of the air <sup>meant for</sup> ~~from~~ the pressure tank to be carried through <sup>to</sup> the barn with the water. By turning the opening of the T downward, he overcame this annoyance.





## *Underground Cable*

When the electrician came to connect the motor he started to string the wires from the corner of the house to the windmill and from there down to the pit.

I don't know how long I'll let that tower stand, said Mr. Matthews, could you run the wire underground? Sure said the electrician, it would make a neater job, too.

So he used lead <sup>*sheathed cable in*</sup> \_\_\_\_\_ galvanized conduit and buried it several inches. In this case the water pipe was already below frost level, but where a complete new installation is made it is advisable to lay a line of small sewer pipe with cemented joints from the basement to the well pit with a duct for both the water pipe and the electric wires. In case of any trouble, they can be removed and replaced without any digging.

## *Improved Sanitation*

Now all I've got to do is get some planks and make a new cover for the pit, said Mr. Matthews. Gee Dad, let's not have any more wooden covers. I darn near fell through the old cover and skinned my shins something fierce, he mumbled. Besides, it isn't sanitary, you know the geese sit around the well practically all the time. So they braced up a platform and poured a single slab of well reinforced concrete, completely covering the pit. For getting into the pit they provided a manhole and they put a little raised curve around it so water would not flow in. They were careful to locate the manhole at one side of the pit so that a man can easily climb up and down along the wall, and to make it big enough to let the motor and pump jack pass through. But just before it was too late, someone made an awful discovery. What if we should want to lift that drop-pipe? How will we ever get it out. We can't bring it through this manhole for it's not over the well. But the manhole was where it belonged so they made another small hole for the pipe and put a plate fitted to it.

A complete job is <sup>*a credit*</sup> accredited to all who helped with it.





Stories About Water Systems *for Health*

As water systems developed throughout the country here and there, there were many stories written and told about them. One might be labeled "Next to Godliness". There was an old addage about cleanliness. Dr. Simon N. Patton, one of the greatest of American economists outlined the benefits of cleanliness, and particularly that agent of cleanliness, the bathtub. In an interesting manner he said "bathing has become the end in its <sup>self,</sup> ~~time~~ and in his house the daily life pivited around it. The bathtub is a parent of that English optomism of which the last two centuries have seen so many examples. The advent of the bathtub is an index of many other changes that tended to emphasize family life.

The introduction of the bathtub with hot and cold water in the farmers home is a bigger event than it seems, particularly where there were a lot of young folks. The old galvanized iron, or wood tub, together with the inconvenience of heating water in the old range and then carrying it to the tub, to say nothing of emptying water out of the tub after it was used, all contributed to the taking of the weekly bath an erksome duty rather than an enjoyable task. Health and cleanliness are closely linked together, and modern medical science tells us that one of the most effective ways of checking sickness is to keep the skin clean, and the pores open. Where a modern bathtub is at hand, and plenty of hot running water within reach by merely turning the <sup>spigot</sup> ~~spigot~~, cleanliness and improved health are sure to result to say nothing of the luxury of having bathing facilities so convenient for use at the end of a hard day in the field or around the farm.





Is it any wonder that those farmers who were fortunate enough to secure this indispensable utility were so enthusiastic in its praise!

Dr. Ahrens: Beginning here (A-Side 2, after 5 minutes) the tape is very low and I can't hear it at all. Possibly the volume was turned too low when dictating into the machine.

Start Apr 30 P 12





### When the Pump Pays for Itself

One farmer tells the story that when he had the gas from his own gas well piped into the house last July, he installed beside his gas range a water system for the kitchen and bathroom heated by gas heater and pumped with an electric pump.

We certainly enjoyed having hot and cold water at the turn of a faucet and the use of a bathroom, but it was not until October 13 that we fully appreciated what electricity could do for us.

The peace of that October morning was broken by pounding on the door and a voice shouting "the barn is on fire". A glance showed a neighbors barn within 100 feet a mass of flames, and the breeze blowing towards our house, and no man at home at either place and the nearest fire engine 8 miles away. To complicate matters a completed gas well from which gas was escaping had been drilled a short time before very near the barn. Fortunately this did not catch fire.

Neighbors came by the dozen. Though the water supply was limited, a hose was attached to an outside faucet and then the electric pump began its work, as the men on the roof kept the water from the hose laying on the sparks which were constantly dropping. The heat was almost unbearable. Fortunately the water not absorbed by the roof ran down into the cystem and was used again and again.

Though the roof of the house was scortched, the house was saved and that little electric pump never complained once. It worked over 1/2 hour without any attention.

The barn was ruined but the house was saved by the constant work of the little electric pump. We feel the pump paid for itself at this fire.





## Automatic Water Supply - The Greatest Convenience

An electric water system, with an adequate income of water supply is to the farm home what city water pressure at the street curb is to the city home. Although complete water service is needed in every farm home, the desire for this type of service had not been felt keenly enough to result in its fulfillment. A comparison of the number of farm homes equipped with water systems with those having radios and automobiles indicates that water under pressure had been put third or fourth place by too many farmers. On the other hand, rated as a labor saver by the majority of farm women, it is the greatest convenience which electricity can bring to the home.

### Dependable Water System is Essential

The need for a convenient satisfactory water supply is universal. It always was and always will be. Our earliest history writings are filled with references to water supplies. Towns and cities and individual homes were located with reference to water supplies. One of the first demands of the buyer or renter of a city home is that it be modern. To be modern it must have water under pressure. After living beyond the limits of the city where water could not be supplied from the city supply and after depending on an electric system to furnish it for 10 years, many people were convinced that the electrically operated water system, said one man, became the most reliable now available to rural residents. An electric water system provides water under pressure, makes it possible to have the farmhouse equipped with plumbing, sanitary features, and to have a safe system of sewage disposal. The completeness of the outfit is important in securing the greatest benefit from it.

There are two types of electrically operated pumps in use - the shallow well or suction pumps, and the deep well or lift pumps. The suction pump is usually located





in the basement and is capable of drawing the water from a depth of 20 to 25 feet. Ordinarily this type of pump should not be placed more than 22 feet above the lowest water level. A 1/4 horsepower motor is usually strong enough to operate the average shallow well system. The cost of operating such a unit is very slight due to the small size motor required.

The deep well electric pump unit for deep well heat as it is usually called differs from the shallow well unit in that it is placed directly over the well with the cylinder down in the well <sup>preferably</sup> ~~perhaps~~ 15 to 20 feet below the normal level of the water. In such an installation the pressure storage tank, control switch and other accessories are usually placed in the basement. A deep well pump usually requires a larger motor depending on the depth of the well.

The automatic switch is the feature which puts the electric water system in a class all by itself. It controls the system and maintains pressure with almost no personal attention. The gravity storage system uses a float to operate the automatic switch, while in the closed tank <sup>hydro-</sup> ~~the~~ <sup>-p</sup> hydronomatic system the pressure itself operates the switch. As the pressure increases, ~~when~~ the pump is working, it operates the switch. As water is used and the pressure is reduced, a spring closes the switch and the pump starts.

<sup>Either</sup> With the shallow or deep well <sup>hydro-pneumatic</sup> hydronomatic <sup>may be</sup> system ~~it~~ is equipped with a fresh water attachment. The most common arrangement is to have a T fitting between the check valve and the automatic control switch. A pipe is connected from the T to the <sup>fresh</sup> ~~pressure~~ water hydrants at the kitchen sink, and in the bathroom. In operation, when a fresh water hydrant is opened, the automatic switch closes immediately, the pump starts and water is pumped directly to the hydrant without going through the tank.





## Well Capacity Determines Pump Size

With a well of adequate capacity a larger pump can be used to advantage, with a reasonably small storage tank. If the water flows into the well slowly then a smaller capacity pump should be selected with a larger storage tank. Many water systems have been condemned because of high energy consumption per 1000 gallon<sup>s</sup> pump, and slow rate of pumping when the inefficiency of the system was due to a poor well and not to the pump. The rate of flow into the well or other source of supply should be known as well as the rated capacity of the pump.

If a complete plumbing system is provided and there is more than one bathroom, with an extra toilet and washroom, besides <sup>sill cocks for</sup> sprinkling the lawn, it is essential that a pump of several hundred gallons capacity per hour be selected. However, as stated before, whether the water should be provided by a larger pump or a smaller one with greater storage capacity is dependent upon the source of supply. Both adequate storage and pump capacity are desirable for a maximum of fire protection. However, a hose delivering a flow of only 5 or 6 gallons of water per minute will put out an ordinary fire, if discovered in time.

It requires a large flow of water to put out a big fire. For this purpose a large quantity of water must be furnished in part by storage and part by pumping. A two horsepower motor is probably the smallest that would be practical to give reasonably good farm fire protection. It should not be overlooked, however, that most farm fires that result in serious damage are those which occur when no one is at home. A special high pressure high capacity pump would be of no value if no one was at home to operate it.





Tape B - Side 2

← The value of a pump with a 1/4 horsepower motor with someone at hand when the fire starts should be recognized.

Where a good deep well pump is already available, operated by gas engine or windmill, it can be easily changed to an electric motor drive by use of an electric pump jack. This is the first step of many farmers toward a complete system. Some jacks are belt or chain driven, however, there are others that are directly connected. It is essential that a sufficiently large motor be provided.

A very inexpensive but satisfactory electric water system which would appeal to many farmers but does not have all the features of a complete system, has been used by one Champaign County, Illinois farmer for a number of years. This, of course, was in the 30's. He has a deep well pump operated by pump jack and controlled by three switches. One at the stock tank, one at the pump, and a third at the kitchen sink. Faucets are provided at the two lowest points, at the highest point the pipe is left open. Whenever he wants water he simply turns a switch and opens a faucet. If both faucets are closed the water will come to the upper end of the pipe.

The cost of pumping was often less than 5 cents per 1000 gallons. Labor used in pumping must be cheap indeed to compete with an electric pumping system. There were few things that would do so much for the house and the home at so little cost as a water system.

#### Water Systems Help Provide Hot Water

A lady one time told the story about when she visited the century of progress. She said, I stopped beside a couple who were looking at an electric water heater. They moved away almost at once, the woman tugging impatiently at her husband's arm, but I heard the end of their conversation. If you can afford a house, the man was saying firmly, you can afford hot water.





I have quite forgotten what he looked like, but he was a man after my own heart. I like hot water. I like lots of it. It shortens so many tedious jobs, it does so many dull jobs better. Water for dishes, floors, clothes, and dusty tired bodies; there is a constant stream of water flowing through our house. I do not like to stop and heat that water before I can use it. I want it to run hot from a faucet whenever I need it.

#### The Water Heater and the Water System

As one lady says, I remember well the first electric water heaters I ever saw. They were small fat tanks padded thick with insulation and covered with a heavy canvas painted gray. Water heaters look different now days. Most of them are large for one thing. They are still padded thick with insulation, for a successful water heater must have plenty of insulation to keep the heat of the water inside the tank, but this insulation is enclosed in a metal shell, painted enamel to fit modern kitchens and basements. The weight of the heating element differs with different size tanks and are designed for different needs. It all depends on how your family likes its hot water. If you want a little water at a time, but are apt to want it quick, a little tank with a big heating element will get it for you. If you need a good deal of water and are apt, as most households are, to want some of it most any time, you will need a bigger tank, but not necessarily a large heating unit. A small element running more of the time will keep the tank of water hot.

You can turn on the electric heater by hand and wait for the water to heat if you are minded to do that. There is even a control called a Tim-o-Stat that you can set like a clock to keep the current on just long enough to heat the water you want to use. It has a face like a clock and you set the hands for 20 minutes, 1/2 hour, or as long as you want. You will learn from the manufacturer and your own experience how long you must set it to get your dish water hot, to get enough for a bath, or water for wash day. When you set it, you turn on the heater,





and when it has ticked through the time you choose, it turns off the current.

To have hot water any time without waiting or fuss you can have the thermostat on the tank. This keeps the water in the tank <sup>hot</sup> by turning the current on when the temperature of the water falls, and off again when it raises. Still another way of controlling the heater is used where your electric company gives you a particularly low rate if you will heat your tank of water at night. These companies have had to set up turbines and generators, build steam plants, and dams big enough to furnish all of the electricity their biggest customer will want all day. They have had to make provisions for lights for all of us from dark to bedtime. Then when everyone goes to bed they can not sell the electricity they should be making to get the most from their investment. They can not shut the steam plants off entirely or they would not be ready to toast our bread and make our coffee in the morning. If the pond behind the hydroplants are full they can not keep the water from spilling over the gates and running off down the river without making a single kilowatt. So they offer current for night <sup>jobs</sup> ~~purposes~~, steady continuous jobs like water heating, <sup>at</sup> ~~and~~ what they call off-rates. These bargain rates for night are usually very much cheaper than the regular rates.

A 30 gallon tank or a 50 gallon tank, the size depending on your family and their habits, each heated to 145 or 160° <sup>during</sup> in the night, will supply your hot water needs for the next day. Heaters <sup>used</sup> using this way ~~of controlling~~ are controlled by a time switch that turns the current on and off at times when the company agrees. Sometimes this is from 9 or 10 at night until 6 or 7 in the morning, it depends on local conditions.

Then to take care of the time when extra demands on the water tank empty ~~it~~ all the hot water before night, they have wired a second heating element in the tank, near the top, ~~to~~ the regular house wiring, uncontrolled by the time switch. Before the temperature of the water drops too far this second heater, appropriately





called the booster heater, jumps into action, and heats it up again. So you can not loose any way you look at it.

With a good electric heater, you are bound to be in hot water all the time.

### The Favorite

In the early 30's an article appeared that was entitled "WATER RUNNING FOR MOTHER INSTEAD OF MOTHER RUNNING FOR WATER". This article describes the various methods of obtaining water for the farm home. In the end it says farming women that have electric water systems are of the general opinion that if the choice had to be made between the water system and other electrical equipment, the water system would be the last to go.

In a recent issue of a magazine there appeared a story in the early 30's with a cowboy hero and beautiful heroin. In his elopment proposal of marriage, one of the inducements he offered was that he would run some sort of a trolly and vale from the house to the well so there would not be so much work packing water. This inducement may have appealed to the ladies on the farm at one time but a much safer bet today would be the convenience and comforts of the electrified farm home.





18135

Dictated

## Economic and Labor Saving Value

If farm electric service were used for no other purpose but to supply running water under pressure in the home, it would be well worth the expense involved. A complete modern water system in the farm home will relieve the mother of the drudgery of the pump handle and the water pail. It will help to save the mother's time and strength and preserve her health. It will add to the value of the farm property, reduce fire risks, and increase farm profits. It is the cheapest servant the farm can hire. The farm without running water in the home pays dearly for it in time lost, in money spent for extra help, and possibly in doctor bills. Considering all its advantages running water in the home is the cheapest necessity that can be secured on the farm. No farm home can afford to be without a modern water system, least of all the farm with electric service.

in the 1920's

In a water supply survey made on a Virginia farm it was found that the farmer's wife was doing most of the water carrying. She made an average of three trips a day to the spring which was 271 feet from the house and down a hill 60 feet below the elevation of the house. In walking to the spring and back carrying two pails of water she traveled an average of 112 miles a year carrying approximately 150 pounds of water each day. In the course of a year she carried around 6500 gallons of water or over 27 tons. In going down the hill to the spring and back up she walked during one year the equivalent of up and down Pikes Peak eight times. Furthermore she was devoting about 45 minutes each day to this backbreaking task or 27 ten-hour days a year. An electric water system would save all of this work at an energy cost of less than one dollar.

### Carrying Water—a Drudgery

The tragedy of such cases is that they <sup>were</sup> are not unusual. Thousands of mothers have worked themselves to an early grave carrying water and there <sup>were</sup> are still







thousands doing just this kind of work on the farms of America in the early 30's. According to the 1920 census only ten percent of the farms in the United States had water piped into the house at that time. In a canvass made of about 1200 rural and urban houses in 14 counties in one of the leading middle-western agricultural states it was found that at 546 homes water was carried.

Many farmers believe that running water in the home is an expensive luxury beyond their means. An abundant supply of fresh, pure water is not a luxury but is essential to the health of the whole family. Everything considered it is the cheapest necessity that the farmer can secure. With electricity available running water in the home can be had for a few cents a day. The amount of electric energy required to pump water varies all the way from 1 kilowatt hour to as high as 6 or 7 kilowatt hours per 1000 gallons. In a study made of the cost of pumping on a farm in Virginia the energy requirements were 1.04 kilowatt hours per 1000 gallons of water pumped from a deep well. At the comparatively high power rate of 10 cents a kilowatt hour, under these conditions it would cost approximately 10 cents to pump 1000 gallons. Would you consider pumping 1000 gal by hand for 10¢ and from a deep well? That's a lot of work.

#### What did the Water Cost?

Automatic systems were new and water was supplied by electricity. It was all new to people and they wondered how much it would cost, so this was a big question. Many questions were asked, and much was written.

One story that appeared - Down in the low country, between Charleston and Beaufort, down where Four Hole Creek ambles out to the sea, there is a little negro church where Brother Mose Allen coaxes and scolds his flock into the way of righteousness. One night he finished up a sermon with the dramatic assertion: "Salvation am free!" Then he sat down and wiped his shiny black brow with a spotless handkerchief. But he had to get up again directly and ask the usher standing importantly at the door to take up the collection.

"How cum you takes a collection, Brudder Mose?"







The interruption came from a group of well-dressed town negroes in one corner of the tiny church.

"You all jus' say salvation am free, and then you ask us to pay for it."

Brother Mose jumped up, his black eyes sparkling.

"Dat all right, Neb. Dat all right. Yo' Mammy goes down to the creek and gets the water every day that comes. She don' haf to pay for it. That water am free jus' like salvation. But off yonder in Charleston, you gets your water from a tap, and - water or salvation - when you gets it piped to you, you has to pay for it."

It goes farther back than that. Every pail of water that comes into our houses costs something and we have to pay its price in coin of one sort or another.

The Jim Hortons live on a comfortable 160-acre farm in Ohio. They have five children, two of them are in school; the other three are still babies, one in the cradle, the others at the mud-pie age. Most of the time Bess Horton carries the water herself, 40 gallons of it a day, from the pump four rods back of her kitchen door.

That seems like a lot of water. I said so doubtfully when I was talking with her one day. She laughingly replied:

"It takes a heap of water in a house to make it home, if Edgar Guest will forgive me saying so."

#### Individual Consumption

And I found she was really quite economical when I studied the tables in a recent bulletin on Water and Plumbing Systems for Farm Homes, published by the University of Illinois. There Professor E. W. Lehmann says they have found that when water is carried in by hand, it takes from six to eight gallons a day for each person in the family; when there is a pump at the kitchen sink, that amount goes up only two gallons a day; but when there is running hot and cold water in the







kitchen, it goes up to fifteen to twenty gallons, and when there is a complete plumbing system in the house, with lavatory, bath and toilet, as well as the kitchen sink, each member of the family may use as much as twenty to forty gallons a day.

So Bess Horton was keeping even below the average with her forty gallons for seven people.

#### Water Needed Regardless of Weather Conditions

It did not cost so much to bring in a pail of water on a pleasant spring morning, or on the first crisp days in the fall. But her family needed water whatever the weather. Fair days or foul, she had to spend at least half an hour a day as water boy. That cost quite a little in time in the course of a month. It cost considerable strength, too, to pump and lift, and carry 40 gallons of water. Sometimes it cost a little bit of her good temper, too, particularly when, with only half an hour to get dinner, with the telephone ringing, and the baby crying, she discovered that the water pail was empty.

The cost of a pail of water, then, must include all three, time, strength, good temper.

Mrs. Horton has not had a vacation for four years, but she has been spending eighteen days often hours each carrying water every year. When her husband put in an automatic water system this last summer, he made her a present of those eighteen days a year for the rest of her life. Perhaps she can not take them to do with as she will; perhaps she will have to spend them right on the farm where she is, but at any rate, she will not spend them with a water pail in her hand.

#### Meters Figure Cost

I have never seen any figures on what it costs in money to supply a family with water by the pail. It is far easier to figure it out when electric rather than human power does the job. We have meters for that.







But there has been a decided lack of definite figures on the first cost of a farm water system all complete and ready to furnish water for house and farm. The reason is clear enough. No two systems cost just the same when you get them installed. Conditions, distances, the depth of wells, are all different. One recent bulletin from Nebraska makes the cautious statement that such a system would have to be very elaborate indeed to cost as much as the cheapest new car on the market.

So it is not because water systems actually cost so much that the bucket brigade still has so many members. But the car is a complete unit, already assembled, just like thousands of others, and ready for use the instant it is purchased at a definite and widely advertised price. While the water system, though much cheaper, must too often be planned, assembled, even installed, by the purchaser himself.

During the <sup>one</sup> past summer one power company in the middle west sold water systems all wrapped up and delivered at the kitchen sink. They quoted installed prices. These were not uniform, of course, for the demands and conditions of one farm differed from those on the next. But they met with the farmer, planned the layout, found out just how much if any of the labor he would like to do himself, agreed on the size of the pump, the motor, and the tank, and decided what accessories, such as furnace coils, and softeners the company should furnish. Then they told him to the penny what the system would cost him.

I went out to see some of those water systems in operation. The first one I saw was on the farm of A. Averbek, near Van Dyne, Wisconsin.

The Averbeks have a well with the water so close to the surface that they can use a shallow well system. They put it down in the basement of the house where it will be safe from freezing.







### Reducing Cost

Mr. Averbeck and the hired man dug the trenches for the pipes, 64 feet of trench from the well to the house, and 75 feet from the well to the barn. It took them four days, for they had to dig through heavy clay soil. Mr. Averbeck estimates that their labor was worth about four dollars a day, so if he had paid for the digging, it would have cost him thirty-two dollars.

The power company furnished them the complete system, with pump, motor pressure tank, gauges and automatic control, and the piping to the kitchen sink, to two hose connections outside, and to the tank in the barn. They installed it for him, and the entire cost was \$200.00.

"We had always had to carry every bit of water to the house, and you can guess we were tired of that," said Mrs. Averbeck. We had wanted a water system for a long time, but we did not know how much one would cost, and we didn't want to get into something where the cost was going to be more than we wanted to pay. Buying a water system this way, we knew just what we were getting and just how much it was going to cost."

The Averbecks have a cousin who is an engineer. He came out and added a hot water tank to their water system. He put the heating coil in the furnace and did the necessary piping. If this had been done at ordinary prices for labor and material, he estimates that it would have cost fifty dollars more.

### Hose Connections Useful

"We've had a lot of good from those outside hose connections this summer," said Mr. Averbeck. "One of them is for the lawn, and the other for washing the car."

"Yes, we had plenty of chance to water the lawn this summer," laughed Mrs. Averbeck. "We used gallons and gallons of sprinkling. I kept our celery patch going with it, too. We wouldn't have had any celery now if I hadn't sprinkled it."







"I used that hose a lot when we were filling silo," went on Mr. Awerbeck. "The corn was awfully dry, and I kept the silage wet when we were putting it in, and then I put some more water in afterwards. The silage is keeping fine. I've had less spoil than I ever had before."

"You are going to take a lot of comfort in having plenty of hot water, too," I suggested.

"Yes," he agreed. "Of course, my wife will enjoy it in the house for cleaning and washing clothes, but we use a lot for our poultry and hogs, too, in the winter. They need warm drinking water and hot mashes, you know."

After we left the Awerbecks, we went back to Kinkers' Korners and turned west to the Herman Totz farm.

Mt. Totz had put in two water systems this summer, one a deep-well system for hard water, the other a shallow well outfit for the cistern. Both are completely automatic. He built a new cistern and dug the trenches from the well to the house, and from the well to the barn. He also furnished the kitchen sink and its faucets for hot and cold soft water and drinking water.

His labor on the job took several days, but he did it when haying was over, and farm demands had slackened a little.

The company installed the two water systems, each with its own pressure tank, laid the pipes, put the coil in the furnace for the hot water, furnished the extra tank for it, - and charged him \$325.00.

At a third place, a shallow well system with a capacity of 420 gallons an hour was put in right under the kitchen sink at a cost of \$141.25 complete.

Once the question of the price of a water system is disposed of the question of its operation bobs up. While we were talking with Mrs. Awerbeck, she had said:

"We thought a water system would be quite expensive to run, but it isn't. We can't see any increase in our bill to lay to that."



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"The corn was awfully dry, and I kept the silage wet when we were putting it in,  
and then I put some more water in afterwards. The silage is keeping fine.  
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### Operating Costs

The operation costs have been determined for us by several experiment stations. Engineers have metered many water systems on many different farms and discovered how much electric current it takes to run them.

Down in Kansas three farm families used an average of 11 kilowatt hours a month to pump water for the house, for watering the lawn and garden. Two of these families had four people in the family, the other six. The water had to be lifted from 94 to 114 feet. They used just over 38 gallons of water per person per day on their farms, and electric current carried it for them at less than two kilowatt hours for every 1,000 gallons.

### Test Results

A two-year test in Iowa is reported in the bulletin Electric Service for the Iowa Farm, published by the Engineering Experiment Station at Ames Iowa. These figures, taken from a table in that report, show an even lower average.

In a Nebraska bulletin on Water and Sewage Disposal Systems for Farms, Ivan Woods writes:

"Since the project of rural electrification was started in 1926, accurate costs of operation, amounts of water used in the house, and data on depths of wells from which water was pumped have been kept. On one farm the well is 65 feet deep. The maximum pressure in the pneumatic tank is set at 48 pounds. The electrically operated water system has required 1 kilowatt hour of electrical energy for every 400 gallons of water. This farmer pays 5 cents per kilowatt hour for electricity for pump operation. At this rate the power cost is 12-1/2 cents per 1,000 gallons pumped. On another farm a well is 35 feet deep, a maximum pressure in the tank is 50 pounds, and 670 gallons of water per kilowatt hour are pumped. At 5 cents per kilowatt hour this cost is about 7.4 cents per 1,000 gallons pumped. A shallow well system pumping from a cistern and against a maximum of 50 pounds pressure in a pneumatic tank is pumping 940 gallons per kilowatt hour of electrical energy used.



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"Since the project of rural electrification was started in 1920, accurate costs of operation, amounts of water used in the house, and data on depths of wells from which water was pumped have been kept. On one farm the well is 65 feet deep. The maximum pressure in the pneumatic tank is set at 45 pounds. The electrically operated water system has required 1 kilowatt hour of electrical energy for every 400 gallons of water. This farmer pays 5 cents per kilowatt hour for electricity for pump operation. At this rate the power cost is 12-1/2 cents per 1,000 gallons pumped. On another farm a well is 35 feet deep, a maximum pressure in the tank is 30 pounds, and 670 gallons of water per kilowatt hour is pumped. At 5 cents per kilowatt hour this cost is about 7.4 cents per 1,000 gallons pumped. A shallow well system pumping from a cistern and against a maximum of 50 pounds pressure in a pneumatic tank is pumping 940 gallons per kilowatt hour of electrical energy used.



"On all of these systems water meters as well as electric meters have been used and read once a month. Where modern toilet, bath and kitchen plumbing are installed, the family of six is using slightly more than 100 gallons per day."

In town everybody connects to the water mains and uses the city water as a matter of course. City water is so cheap that no one is willing to do without it. Yet the rates are almost always more than 10 cents per 1,000 gallons, and under many conditions the electric current to pump water on the farm actually costs less than water drawn from the city supply.

What is the market price of water on your farm?

#### Costs and Comfort

In the early 30's, a story appears about a family in Alabama that installed an electric water system, and the story tells how they did it and how much it cost them to operate it.

The water pump on our farm, the owner said, gives more service than any other piece of equipment we have installed, and the cost of operation is very small in relation to the amount of time it is operated, states Mr. Clarendon Davis, R.F.D. 3, Huntsville, Alabama. Mr. Davis has the unique distinction of being the first user of a home electric plant in Alabama, and was one of the first farmers of the state to request and obtain service from a rural electric line.

Four years later, in August, 1926, test meters were installed on the range, water heater, water pump, electric refrigerator and lighting circuit. Readings were taken for 47 months and they furnish very interesting information as to the amount of electricity required for the different operations.

#### The Water Heater

The electric range, which has done practically all of the cooking for an average of five people and is operated by a cook under Mrs. Davis' close supervision, has used an average of 168 kilowatt-hours of electricity per month.



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range, water heater, water pump, electric refrigerator and lighting circuit. Readings were taken for 45 months and they furnish very interesting information as to the amount of electricity required for the different operations.

#### The Water Heater

The electric range, which has done practically all of the cooking for an average of five years and is operated by a cook under Mrs. Davis' close supervision, has used an average of 168 kilowatt-hours of electricity per month.



The electric water heater is used as an auxillary means of supplying hot water for the family in winter and is used in the summer to supply the entire needs of the family. The heater is the side arm type, connected to a 30 gallon well insulated tank and is operated by hand control. It used an average of 19 kilowatt hours per month to meet these requirements.

The water pump used an average of 17 kilowatt-hours per month to supply the water to the home and for the farm livestock, in addition to watering the garden, flowers and yards in dry weather.

The electric refrigerator, which consists of a nine cubic foot box and air-cooled compressor with 1/2 h.p motor, has used an average of 54 kilowatt hours per month.

The electric lighting circuit, which includes lights for the home, barn and yards - in addition to electric iron, vacuum cleaner, toaster and percolator - has used an average of 44 kilowatt hours per month.

For all of the above operations there were used during the 47 months a total of 14,167 kilowatt hours or an average of 301 kilowatt hours per month.

#### Present System Cheaper

Prior to obtaining electric service from the Alabama Power Company, Mr. and Mrs. Davis were using a farm lighting plant to light their home, a gasoline engine to pump water, both an oil stove and a wood or coal range for cooking, and were hauling ice from Huntsville for household refrigeration. Mr. Davis estimates from his own experience and cost records that electric service for his present uses is \$26.13 cheaper per month than his former cost for the same operations, not including any value for the increased conveniences nor for the labor saved in the home. This saving amounts to \$313.56 per year, which is a very considerable item - especially when life has been made more pleasant for the entire family.







## Efficiency in Innovation

All of the equipment on this farm is arranged so that it requires a minimum amount of space and at the same time affords maximum convenience to the user. The deep well force pump is driven from shafting located at the ceiling. The pulley for this installation was built in the farm work shop. The 1 h.p. motor is also located at the ceiling, which gives more space on the floor for other uses. It performs other duties besides pumping water, the most frequently being the running emery wheel.

## A Novel Layout

Mr. Davis has a very practical arrangement of pipe lines to take considerable load off of the motor when it is pumping water to the stock. He has the pressure storage tank located in the cellar of his home, and a large concrete trough in the lot for watering the stock. The pipe lines divide just after leaving the pump and there is a cut-off valve in each of these pipes. When pumping water for the stock, the valve on the line to the pressure tank in the cellar is closed. Then the only work that the pump has to do is to raise the water to the top of the ground, while if this water had to go through the pressure tank, the motor would not only have to do the work of lifting it to the top of the ground but would have to pump it into the tank against its pressure.

During the dry season of the year, which is usually the late summer and early fall, the water pump has proved an invaluable aid not only to garden crops and flowers but to shade and fruit trees around the house as well. The pump operates ten to twelve hours on some days in this season of the year.

The farm has 17 horses and mules, 4 milk cows - besides chickens, hogs and other livestock. The average yearly consumption of electricity for this water pump over a four-year period amounts to 208 kilowatt hours.







## Problems - Learning and Innovation

Problems that may have been fairly typical when a Rural America was learning to use electricity, are demonstrated, in a Reader Service Publication, in the Question and Answer page. These questions demonstrate the education and innovation that took place, such as:

Question: One reason I wired for electricity was to pump water, I supposed an electric motor would last a long time. I have had two in one month and they both played out and I am again using my gas engine on the pump jack. What I want to know is how big a motor I need. It is 12 feet from the well platform to the water, the water is pumped to a storage tank in the house and piped from the house to the stock tank. I was told a 1/4 H.P. motor was large enough and I bought a new guaranteed motor for \$9.00. It lasted two weeks, the company sent me a new motor and it lasted one week. Do larger motors wear out so quick too and will a 1/2 H.P. motor be big enough?

Answer: I assume that your pump jack is used on an ordinary windmill type pump, if so with the installation you describe, a 1/4 H.P. motor is large enough. A new 1/4 H.P. motor that can be purchased for \$9.00 would indicate that it was a wplit phase motor and a split phase motor is not designed for such jobs as pumping water. Other farmers have made this same mistake and became discouraged with electric operation, when it was no fault of the service. Split phase motors are not intended for use where a high starting torque is required.

Small motors, 1/4 H.P. size or less, are made in two types - the split phase and repulsion induction. In the split phase motor there are generally two windings interposed on its stationary field. One winding, the main or running winding is connected to the line while the motor is operating; the other winding, the starting winding is connected to the line only long enough to start the motor and bring it up to induction speed, when it is automatically disconnected by a







centrifugally operated cut-out switch. To start the motor the two windings take about seven times the normal rated current load. This heavy inrush of current combined with a very low overload starting capacity quickly burns out the windings unless the load starts easily and quickly. A pump jack neither starts easily nor gains normal speed quickly, consequently it is no job for a split phase motor. Other undesirable characteristics of split phase motors are that when connected to a circuit supplying lights, they cause a flickering or dimming of the lights during the starting period, and if the voltage drops as much as 10 percent below normal they are likely to stall which again *means burned windings.*

The repulsion induction type motors have none of the disadvantages of the split phase type. They are a rugged motor designed for long time operation. These motors start as a straight repulsion type, the armature current being carried through a commutator and brushes. As the motor approaches its rated speed the commutator bars are all automatically short circuited and the motor then runs as a straight induction type motor. Motors of this type have a large overload capacity and will start and bring up to speed 100-200 percent of their rated load on about twice the normal running current.

The starting torque is 300-400 percent greater than the average split phase motor and it will start the same load on about 20 percent less voltage than the split phase type.

With a 1/4 H.P. repulsion induction motor manufactured by a reputable company such as your power company would be glad to recommend, you can depend upon satisfactory pumping operation. Motors larger than 1/4 H.P. are of the repulsion induction type.

Question: How can an electric lamp bulb be used to keep water from freezing in the poultry house?







Answer: A simple method is to take an empty coffee can, punch a hole in the cover <sup>for</sup> ~~in~~ the extension cord, attach a lamp socket on the inside of the cover and use a 40-100 watt lamp, depending upon the amount of water. Fill the can half full of sand or gravel and put on the cover. This is done by inverting the can and putting on the cover at the same time to permit the lamp to get partially below the sand. The sand merely weighs the can down and keeps it in an upright position in the water pan. Heaters of this type have proven very satisfactory.

#### More Innovation

It takes all kinds of water systems to make a world. If you live on a farm, you hear very little of the intricate system of wells and tunnels and dams and rese-voirs that assure a constant stream of water at the faucets of a great city. You do not have to pipe water 125 miles from some distant hills to your farm. The source of your water supply is a well or a spring right at your very door.

But when you get tired to going to the well every time you need a drop of water, and when you decide that you want the water to come to your kitchen and a bathroom in your house, and out to your barns and cattle in the barn, then you yourself must plan to get it there.

You can buy the working parts of a water system off the shelf. The pump that lifts the water from the well; the tank that provides the pressure to carry it along the pipes; the motor that drives the pump - all are ready to use. But putting in the water system and laying out the pipes to carry the water wherever it is needed takes separate planning for every farm.

A man need<sup>ed</sup> not go at his planning blindly in <sup>e</sup> ~~this~~ year of 1932, however. The United States Department of Agriculture has three bulletins telling about farm water systems, and the Agricultural Engineering Departments of half a dozen colleges have published careful and complete recommendations for selecting and installing farm water supply outfits.

Then a man's neighbors can give him excellent hints on how to make his head save his heels, too, if he will go and see the way they have trapped the water







on their farms into doing its own running. One man that seemed proud of his system was Carl J. Brumm. "Yes sir, we do have a water system," he said enthusiastically in answer to a question. "I'll be glad to show it to you."

He led the way into a building that was a combination of garage and farm shop.

#### Pump Freezes Up

"Our well has always been here," said he, "and before we put up this building, we had a windmill. But for some reason we always had a great deal of trouble with our pump freezing up, particularly when the wind was in a certain direction. There was a vent hole in our well pipe down below what we considered the frost line, but there must have been something about the way the well was stoned up that let the cold wind in from a certain direction, for it would freeze up every time the wind blew that way. So we finally decided to do away with all that trouble and to put in something we could depend on."

So they built them a well house. While they were about it, they made it big enough to hold their truck and their car and still have room at one end for doing their repair work. But to get their tank and pump and motor out of the way, and as a further protection from freezing, they decided to put them all down in an underground pit.

Mr. Brumm uncovered a hatchway in the floor near one corner, snapped on the light, and led the way down a short ladder into the pit.

This pit was about eight by ten feet and plenty deep enough to stand up in. It had good concrete walls and floor, and an electric light wired in conduit. Both the motor switch and the light switch were on the wall in the room above.

"This well is 160 feet deep," said Mr. Brumm, "so we put on a three-quarter horse motor. It pumps 240 gallons an hour. The slick thing about this pump is that it delivers water both on the up stroke and the down stroke. That makes a much steadier load for the motor."







"How does it do that?" I asked.

"Well, you see right here at the base of the pump is what you call a differential cylinder. It takes the place of the packing gland around the rod of an ordinary force pump. It's open on the lower end and closed at the top and has in it a plunger with leathers just like the cylinder down in the well, except that it is only half as big. On every up stroke half of the water fills this cylinder and the other half is pumped out. And on the down stroke the water in this differential cylinder is forced into the tank, too. That gives us a much more uniform flow."

"How much does your tank hold?"

"If it were full of water, it would hold thirty gallons," he answered. "But we're never able to draw that much out of it because this is what they call a hydro-pneumatic system."

In a hydro-pneumatic water system the storage tank holds both water and air. When the pump is started, the air fills the whole tank. But as water is pumped in, the air is compressed in the upper part of the tank. By the time the tank is two-thirds full of water, the air will exert a pressure of about forty pounds per square inch, and that is enough force to send the water through the pipes of an ordinary farm water system. In fact, forty-three pounds pressure will lift water 100 feet but it will not provide a satisfactory flow at that height.

Hydro-pneumatic systems have a pressure switch that stops the motor when the pressure in the tank is high enough, and starts it again before the pressure gets so low that the water comes very slowly from the faucets. On Mr. Brumm's system the switch is set to stop the motor at forty pounds pressure and to start it again at twenty pounds pressure.

Drawing about ten gallons of water from this thirty gallon tank will cause the pressure to drop from forty pounds to twenty pounds, starting the motor that fills it up again.







"How long is the pipe to the barn?" I asked Mr. Brumm.

"Just about eighty feet."

"How long did it take you to dig the trench for it?"

"That's the remarkable thing about this water system," he said, smiling broadly. "We didn't dig any trench. You'd never believe it, but we pushed the pipe through the ground from here to the barn."

Then he explained just how he and his brothers avoided all that digging in a tight clay soil. They decided where they would like to have the water pipe enter the barn through the basement wall. Next, they measured eight feet above that point and stretched a string tightly from there to the well pit. By fastening it just eight feet above the point where the pipe would leave the pit, they established the slope and direction that the pipe would have to take.

They cut their pipe in ten foot lengths so that they could get it down into the pit. On the front end of the first section they put an ordinary coupling and screwed a plug into it. They carefully aimed this first length so that it was exactly parallel with the string they had stretched and just eight feet below it. Then with a good automobile jack they began pushing the plugged end of the pipe through the ground.

Each time they extended the jack to the limit, they put a blocking and began again. When they had pushed the first piece as far as they could, they brought another length of pipe into the pit, coupled it onto the first one, and went on pushing.

"It wasn't very fast," said Mr. Brumm, "but it was lots easier than digging."

"What if you had hit a rock?" I asked.

"We did hit a couple of small ones," he replied. But we knew just how far they were from the well pit here by the length of pipe we had shoved in, and we assumed they were right under the string. So we dug down with a post hole auger till we







found the stone. Then we made the hole a little deeper and pried the rock off into it.

"The important thing is to get the pipe, started in exactly the right direction, and then not to hammer it or force it if it strikes something."

"Did you come out in the right place at the barn?" I asked.

"It so happened that we did. Our pipe came into the very stall where we intended to put it, but so long as it stayed deep enough to be safe from frost, it wouldn't make a great deal of difference where we came into the barn. We could pipe the water where we wanted it anyway."

#### Pump Motor Helps in Other Ways

One man installed a good self ~~oiling~~ pump head driving it with a separate motor through a two-inch leather belt. Though the depth of his well did not require it, he bought a one horse motor which is big enough for his other power jobs.

But Mr. Pierstorff's pump would certainly freeze if it brought the water to the top of the ground out there at the shop. To avoid that he put in what is called a "frost proof attachment" that extends about six feet down from the bottom of the pumping head. The packing gland for the pump rod and the discharge outlet for the water, as well as the pressure switch are all down at that depth in a very small easily made pit. From them the discharge pipe runs under ground to the house cellar where the pressure tank is located. This pressure tank supplies water to both house and barn.

Such systems as described or some modification of them will usually solve the water supply problem on farms where the water is down more than 22 feet. Several reliable manufacturers supply them in a range of sizes to fit almost any need.

Most experiment stations recommend <sup>ed</sup> pumping the water for the live stock into an overhead tank in the barn and letting it flow by gravity from there to drinking cups or water troughs. This provides a little reserve supply in case of accident to the pump or to the electric line, and it reduces the pressure on the







drinking cup valves. However, many farmers seem perfectly satisfied to omit such a tank and to put their drinking cups right on the line from the pressure tank. Occasionally a man uses a regulating valve to reduce the pressure, but in my experience, the majority do not.

If the water in the well is never more than 22 feet below the place for the pump, a shallow well system can be used. In a shallow well system the pump cylinder is not down in the well, but is attached directly to the pumping mechanism. It draws the water by suction through a pipe reaching into the well.

For that reason the shallow well pump need not be placed directly over the well. It will draw water a considerable distance horizontally if the suction pipe is absolutely air tight, of reasonable size, and without too many abrupt turns. Where a shallow well is only a short distance from the house, the best location for the pump and pressure tank is in the cellar. That is an easy place to install them and to give them the very little attention they need, a convenient place to connect the motor to an electric circuit, and a place safe from freezing. Not the least advantage of the shallow well system is that it is usually much cheaper than a deep well outfit.







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## WHAT IS IT WORTH TO HAVE WATER UNDER PRESSURE IN THE HOME?

Farmers, who have water under pressure, say invariably that it is worth much more than it costs. They say, "We do not think so much of the water system itself but it is the things that it makes possible that count: the showerbath after a hard day's work; the turn of the faucet to water the horses after returning tired from the field; a plentiful supply on hand at all times without having to ask someone to go fill the bucket. It is impossible to put a money value on a lot of these things."

In fact, most people, when asked, refuse to attempt to put a money value on water under pressure in the home. The only comment of Harry Reifsteck, one of the cooperators on the Illinois experimental line, was that having water under pressure in the home was priceless. His father, George Reifsteck, was one of the first in the community to put in a water pressure system, one of the old engine driven types with a large pressure tank. This system was changed over to electric drive with automatic control in the 20's. Mr. Reifsteck considered providing water under pressure as the most important step in making the home modern.

A. E. Burwash, a Champaign County dairy farmer, stated that he would not be willing to get along without his water system and the things that are made possible by it. In addition to having all the modern facilities in his home that are found in the city home where water is provided under pressure, he has a sufficient amount for the dairy cows and other livestock. He stated that a plentiful supply of hot and cold soft water and water for drinking is indispensable. A farm woman in Missouri once told me that when they had influenza in their home during the serious epidemic in 1918 that she considered their bathroom with its sanitary facilities worth at least \$100.00 a day to them. Without the







water under pressure and without the sanitary equipment it would have been impossible for them adequately to care for themselves since they were all sick.

To say it is worth \$100.00 a day to have water under pressure, with sanitary facilities, on the farm, or to say it is worth \$10.00 a day, is merely an attempt to put a money value on things of which, under certain circumstances, the value cannot be expressed in dollars and cents. In case of sickness a life might be at stake; a money value is not normally put on members of one's family.

Although an ordinary water system may not give complete fire protection, it certainly has some value in this connection. The most complete system would be of little value if there was no one at home. If a fire is discovered in time, to have water under pressure would be a great advantage over the bucket method of putting it out.

The question "What is it worth to have water under pressure in the home?" can best be answered by one or more counter questions. What would it be worth to have a bathroom and sanitary fixtures when there a sick folks or very old people in the home? What would it be worth to have a plentiful supply of water at all times? In case of fire? When the temperature is 20° below or when it is 110° in the shade? What would it be worth to save the strength and time used in carrying the thousands of gallons of water used each year in the farm home? The value of all these things give some indication of the value of water under pressure in the home.

#### Everyday Use

Water under pressure is of special value in easing the work in the house. This work might be classified under four heads: 1) the care of the family, 2) the care of the house, 3) the care of the clothes; and 4) the care and preparation of food. It is worth a great deal to have water both hot and cold when there are small children in the home. A plentiful supply tends to promote the



habit of cleanliness because bathing is done more frequently and under better circumstances. In studies that have been made by workers interested in home improvement and improved living standards it has been found that when water is carried by hand, only five or six gallons per person are used each day, while when water is provided under pressure, thirty gallons or more are used. This means not only cleaner clothes and cleaner bodies but also cleaner homes.



## KEEPING IN HOT WATER

*Extracts from Sterilizer*

Unless you want to drink it, you have to heat most of the water that comes into the house before it is ready for use. Unless you have a water system, you may have to do this in the reservoir of the kitchen stove. Then all the cold water has to be carried and lifted into the reservoir, and all the hot water lifted and carried away again. It costs a lot to get hot water that way. Countless steps, lugging heavy pails, waiting for fires, irritation and muss.

But when water runs from faucets into your sink, the same electric current that carries the water can heat it, too. You can have hot water, a pint or a tankful without all that work.

Hot water for dishes without building any fires, carrying any coal, or carrying away any ashes. Hot water for baths with no one running down stairs and poking the fire to heat up the tank. Hot water on wash day without getting up early to heat the water.

And every day and every day plenty of hot water ready to wash and rinse the milk strainers, the milk cans, the pails and the milking machine. All the hot water you need to wash the cream separator. And on cold winter mornings, plenty of hot water at the turn of a faucet to mix a warm mash for the hens or fill their drinking fountains. And Fridays, when you dress the poultry for the market, hot water ready and waiting for the job.

You have to get hot water for these things somehow. You will find it easier to get it electrically.

There are several kinds of electric water heaters to choose from. Some of them heat the water before it enters the tank. Some have heating elements fitted inside the tanks. These may be units of large wattage to heat a small amount of water quickly, or they may be smaller units to run a longer time. Either kind can be







fully automatic; it can be turned on by hand, or it can be controlled by a timing device like the clock on an electric range.

Because electricity can be managed by remote control, the switch or timer can just as well be in the kitchen or bathroom as down by the tank. When you want hot water, you turn the switch and let it heat. Or with the timing control called a Time-O-Stat, you turn it to run twenty minutes for water for dishes, three quarters of an hour for Jimmy's bath, or some such schedule worked out for yourself when you find out how long it takes to heat the amount you want.

#### Off-Peak Heaters Becoming Popular

The fully automatic tank heaters with low wattage heating elements are becoming increasingly popular because they can often be used at a very low rate. This is not when they are run at any time like any other appliance, but when they are controlled by a clock that cuts them off when other uses of electricity are heavy. They call these off-peak heaters.

Do you know what the power company men mean when they talk about peak load? Every minute of the day they have a record of the amount of current they are supplying. The line on the chart that shows how much electricity is being produced varies more or less throughout the day. But along about dusk, it begins climbing up like a child's picture of a mountain. At nine, maybe later, it begins to drop off sharply, leaving the record of a little mountain peak of heavy use. The company has to have generators and turbines, power houses and lines enough to supply the current needed at the moment of greatest use, at the point recorded by the top of that peak. Then all night long, much of that equipment runs at half load or less, for folks don't use much electricity during the night.

Now water heating is a job that can be accomplished for you while you are asleep. It really does not make any difference to you when the water is heated so long as it is hot when you want it, does it? That is what the power companies







have figured out too. So they tell you, many of them, that if you will have your water heater set to operate any time between 9 o'clock at night and 9 in the morning, and from noon until around 4:30 when these power wires are not fully loaded, they will give you a very low rate for heating the water. Of course, that does not mean that the current would be on all that time. It would be on only so much of the time as was necessary to keep the water in the tank at about 150 degrees according to the thermostat setting.

#### Forerunner of Todays Quick Recovery Tank

But just in case you might have sudden need for hot water in excess of your normal supply, which they figure carefully for you in planning your installation, these tanks have a second heating element called a booster unit in the top of the tank. If you draw off so much hot water that the temperature drops too far, this booster unit goes into action long enough to heat it up again.

Of course, all the tanks for electric water heaters are well insulated so the heat loss through the wall is small. Even when the water inside the tank is hot the outside is barely warm. That saves current of course, and it makes the heater a comfortable thing to live with right in the kitchen. And often the kitchen is the bestplace to put an electric water heater, because water is drawn most frequently and in small quantities at the kitchen sink. Having a short distance to travel here will cut down on heat loses.

There is no reason why it should not stand in the kitchen because it can be put anywhere. It does not need attention or adjustment, so you do not have to leave room or work around it. There is no flame, it needs no draft or flue to carry away the fumes. It takes no fuel, so there is nothing greasy or dirty about it. It presents no fire hazard, so it offers no menace to the house.

For a hundred jobs that demand quantities of hot water, these heaters offer a constant, steady supply, so completely automatic that you need never give it a







thought; all you have to do is turn a faucet marked H when you want hot water.

### A Good Idea

But sometimes you want it boiling. Electricity can take care of that, too. Here is a beautiful combination tea kettle with a 1150 watt heating element inside. You cover that heating unit with water when you fill the kettle through its short wide spout. The cover on the spout flips back when you pull the lever on the handle.

This tea kettle is fast. Pour in a couple of pints of water, plug in the cord and you will have a quart of boiling water in less than six minutes. Or if you are in a great hurry, set the kettle on the stove. By the time you can get out the coffee maker, lift down the coffee can, and measure four tablespoons of coffee into the pot, the kettle will be whistling in your ear that the water is on the boil. That is one very very nice thing about this teakettle. You can use it as an electric tea kettle; you can leave off the cord and use it on the stove like any other kettle, or you can plug in the cord and set it on the stove, too.

Isn't that convenient for getting shaving water in a hurry, for water to warm the baby's food, for for a sudden emergency supply? And when you need boiling water for cereals, for coffee, for tea or cocoa, when you need it for baking, this is a quick and efficient way to get it.

If you want to keep yourself in hot water all the time, electricity will be a great help to you, a pint or a tankful, remember.







## Well Water for Well People

Water, besides being the most important of the six foodstuffs upon which the human body depends for growth, is used in so many other ways in the daily routine of life that it holds first position in providing for the health and happiness of humanity.

A safe water for drinking is the prime requirement of the farm supply, but by no means the only one. The ease with which water is secured determines the extent of its use in cultivating good health.

Most people do not drink enough water. They are content to merely satisfy their thirst. Doctor J. A. Pollia, one of the leading health authorities of the country, states that the advantage of taking a prescribed number of glasses of water a day is that it gives the organs of circulation and excretion more work to do and therefore produces a mild form of exercise for the heart, blood vessels, lungs and kidney. It is generally agreed that adults should drink two quarts of water daily, although the quantity may vary considerably depending upon the type of work performed by the individual as well as the season of the year.

The ease of getting cool, palatable water has a direct bearing upon the amount consumed. If no hand pumping is required, and if cool water can be brought to hand by merely turning a tap, the average person will refresh himself much more frequently by a drink of water. The increased consumption of water tends to improve the health of the individual. Thus the modern electrical water system, which delivers water at any time, and fresh as well, has established itself as a real aid to health, particularly where a pure supply may be had from deep wells.

Ease in securing water also has a direct influence upon the extent to which it is used for bathing and other cleansing operations. If the water has to be pumped by hand, and if the old pump doesn't work easily, many a hand or face







washing is neglected; likewise in the case of baths. Some families go to other sources of supply than the pump when it comes to getting water for bathing or washing. Water is brought in buckets from a nearby stream, and here is where trouble may occur. The stream may be badly polluted, and the containers used for carrying this water may subsequently be used for handling drinking water. In this manner what would otherwise be a bucketfull of pure water for human consumption may become polluted through being placed in the pail which still retains some from the creek.

#### Washday Need Not be Unpopular

What has been said regarding the use of water for bathing purposes applies equally to laundry. Where the well supply was the only available supply, and where all the water must be laboriously pumped, washday was a very unpopular day on the farm. Less water will be used in laundering and many garments which otherwise would be kept spic and span may have to do without a periodic cleansing. If John Wesley was right, when he said "Cleanliness is indeed next to Godliness," the old hand pump can be charged with making a lot of ungodly people.

By like reasoning, a modern, motor-driven water system, delivering all the water needed at all times, should deserve credit for a very wholesome effect upon the farm folks in general.

One point commonly overlooked in connection with the modern farm homes is the question of proper sanitation. Where there are no automatic and dependable supplies of water, privies, either of the sanitary or unsanitary type, still remain. The latter is credited with many evils, not the least of which is the breeding of flies, which serve as carriers of germs. Modern sanitary facilities in the farm home are impracticable unless plenty of water under pressure is available.

So the modern water system, operated by a dependable little electric motor, has a far greater influence upon the health and happiness of those who live on farms than is generally recognized.







### An Every-Hour Necessity - Running Water

To depict anguish and distress, artists have often painted by brush or in words a picture of suffering caused by thirst or drought, thus recognizing the necessity of water to sustain life. They have not dwelt upon the every hour use of it or the comfort and happiness gained by bringing the supply of it from a distant almost inaccessible source to our very finger tips.. So much that we enjoy is taken for granted and accepted as a matter of course. So much that we put up with can be changed or bettered by knowledge of improved methods and application of those methods to our needs.

Not only can water be pumped from the well, cistern, river or lake but it can be made to run up hill as well as down and, by putting it under pressure, delivered to any point desired in the house or barn.







## When Fire Strikes

A fire on the farm is easy to handle just after it starts, but let it gain headway and heavy damage will probably be done. City or town fire apparatus, if called, usually arrives too late to save the building in which the fire originated.

That farm fires start small is evident from the nature of their causes. The principal causes of farm fires, listed in order of their importance, are:

1. Defective chimney flues.
2. Lightning.
3. Sparks on roof.
4. Gasoline and petroleum products.
5. Matches and smoking.
6. Spontaneous ignition.
7. Stoves, furnaces and their pipes.
8. Hot ashes and coal, including open fires.

In many cities over 90% of all fires extinguished by the fire department are put out with "chemical" lines. These chemical lines are small hose lines about the size of garden hose, which deliver on the fire a weak solution of soda and water. The presence of the soda in the water is not for extinguishing purposes; it is there to produce, when mixed with sulphuric acid, a gas pressure for forcing the water-soda solution through the hose and on to the fire. It is the water which puts out the fire and the mixture of soda and water has no more extinguishing effects than a like quantity of plain water.

A fire engine may carry from 30 to 160 gallons of the solution. And yet with this limited quantity it is highly effective in putting out most fires.

In many industrial plants, office buildings, places of public assembly, and even in private homes, small "soda and acid" extinguishers of 2-1/2 or 3 gallons capacity may be found. They have proven themselves, over many years of use, to be very effective in handling little fires, that is, fires shortly after they have started.







The modern farm with a pressure water system is in an excellent position to provide itself with very effective fire protection. Just as city fire departments have found that most fires can be exteinsuished with little water, farmers, too, find that pressure systems, if provided with conveninet taps and hose lines fitted with nozzles, can handle practically any fire which starts, provided it is caught in its early progress.

Among professional fire fighters there is a saying that "it's the first five minutes that counts" when handling a fire. If water can be put on the fire in a couple or three minutes there is little chance of it spreading.



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### A Problem - Cost of pumping

In the mid thirties a farmer who had recently installed a water system was experiencing electric bills he thought were too high, so he wrote to the question and answer service in a farm publication.

Question: I have a dairy farm and require water for about 60 head of cattle. On the advice of a local dealer I installed a shallow well pump and have been having trouble ever since.

My electric bill for the pump alone has been over \$20 a month. I have other electrical appliances that I cannot afford to use on account of the high cost of pumping. I would like to use an electric motor for grinding but am afraid the cost of operation would be too high.

I would appreciate information on what you mean by "cheaper electricity on the farm" as emphasized on the cover of your magazine in February.

Mrs. W. G. Stone  
Lee Hall, Virginia

Answer: There are three things or a combination of three things that may be wrong with the water system.

1. The pump may be defective.
2. The wrong type of pump has been installed.
3. A "short" may exist in the distribution system that causes an excessive loss of electricity.

The amount of water normally required for house use and 60 head of cattle would be about 20,000 gallons a month. The amount of electric energy required to pump 20,000 gallons of water should not exceed 40 k.w.h. At 10 cents per k.w.h. the cost would be only \$4.00.

A shallow well pump with a capacity of 450 gallons per hour equipped with a  $1/3$  h.p. motor using 400 watts per hour would operate about 45 hours per month or  $1-1/2$  hours a day to pump 20,000 gallons.







To "pump" a \$20.00 electric bill at 10 cents per k.w.h. the pump would have to operate 500 hours per month or 17 hours a day and at rated capacity would deliver 225,000 gallons of water. At 7 cents per k.w.h. the pump would operate continuously.

A condition of this kind would indicate a "short." Remove the cover from the pressure switch and check results. With all lights, appliances and equipment "off," see if the meter disc revolves: if not start the pump and determine by watt hours per disc revolution (explained in Dec. 1932 issue of Electricity on the Farm) if the motor is using too much energy. On rated load a 1/4 h.p. motor uses energy at approximately 300 watts per hour: 1/3 h.p. 400 watts: 1/2 h.p. 500 watts.

Sometimes a slow flowing well causes a lot of trouble. The apparent water level may be within the 20' vertical suction limit of a shallow well pump but lowers below the suction limit as the pump operates. A well of this type requires a deep well pump.

Occasionally an over-zealous salesman sells a shallow well pump on a deep well job in order to underbid a more reputable competitor.

In regard to electricity as a cheap source of power, there were, on January of this year 691-753 farm of the U.S. equipped with high line electric service. I would estimate that on 60 percent of these farms some kind of an electric water system was in operation and that 99 percent of the operators consider electricity the cheapest source of power they ever used for pumping water or for doing the numerous other farm jobs so ably and economically done by the electric motor.

Grain grinding equipment may be secured that range in power requirement from 1/2 h.p. to 5 h.p. that will grind grain on an energy consumption ranging between 4 and 30 k.w.h. per ton depending on the kind and fineness of the grain ground. Home grinding with electric power is proving very satisfactory and profitable.







## The Mother of Inovation

The old saying that necessity is the mother of inventions should have the word "necessity" changed to "depression". Fred Miller, who lived on a farm, a mile south of Cedar Springs, Kent County, Michigan, wanted a pump jack and like many these days was shy the means to buy one. He did, however, have a hand power clipping outfit that was collecting dust and rust. Lack of available funds for new pumping equipment did not keep him from putting electricity to work for this task.

Miller has a mechanical turn of mind and he put it to use. Cutting the standard of the clipping outfit off about a foot below the gear box, he fastened it in a 2x8 plank, 3 feet long. On the side where the shaft had been he attached a 10-inch pulley for which he paid \$1.10. To the end of the crank he fastened a piece of oak, bolting the other end of it to the pump handle as shown in the picture. Seventy cents was spent for a belt. A 1/4-H.P. motor was bolted to the other end of the plank. The belt was attached, the juice turned on and the outfit worked. The well is 44 feet deep and supplies water for 18 cows and 2 horses. Two of Mr. Millers neighbors, Ray Thompson and Herbert Wolf, have similar pumping outfits.

While a complete water system, or even a factory-made pump jack would give better service, still the homemade jack provides a big advance over hand operation of pumps.







### A long line

When William Dunlay moved to his new farm near Manlius, N.Y., he found a fine well-spring of pure water, just what he needed for his household needs and for the large dairy barns. But the spring was all of 800 feet from the barn and the house, and on the other side of a hill.

Mr. Dunlay didn't give up the idea of having running water just where and when he wanted it. He had a ditch dug from the barn, up over the hill to the spring. A water pipe and an electric trench cable were laid in this ditch. In low spots where water might accumulate, the cable was housed in a pipe. The cable was connected at the meter in the barn and with an automatic electric pump at the spring. The pump was enclosed in a small concrete housing, replacing an old windmill.

It was one of the longest installations of underground cable for farm use in this section, but Mr. Finlay has found it efficient and economical. He has all the fresh water he needs for house, barns and milkhouse, without even the effort of pushing a button. The underground installation has eliminated poles across cultivated land, removed the possibility of interruption by high winds or ice storms. In spite of the coldest winter in half a century, the pump delivered water through the long line without a hitch.







### Hourly Costs

In 1935 an editorial appeared in a farm publication assessing the cost of pumping water by hand and with electricity.

What does the housewife receive for pumping water by hand?

Of course she doesn't receive any actual money for this, but the work of pumping is worth a definite amount, based on what it would cost to pump it using electric energy which can be measured and assigned a definite value.

Comparing the costs of what a man or woman can do with what it would cost to do the same work using electricity reveals startling statistics, even in 1935.

In the Maryville Ohio Experiment Station, it was found that 13 families used 125,000 gallons of water a year. It would cost \$10.30 to pump that water with electric energy. If a strong man could pump hard for an hour, he could pump about 300 gallons. At this rate he would have to work 416 hours to pump 125,000 gallons and if 25¢ an hour was a reasonable rate of pay at the time, it would have been worth \$104.00.

But if the man had only been paid the \$10.30 required for electricity to pump the water, he would have earned 2-1/2 cents an hour. This would be of interest to all those who spent long hours on the business end of a pump handle.

Of course this does not include the initial cost of the water system, and that is what delayed many farmers from obtaining an automatic water system when electricity was available.







### Another innovation provides emergency water

Felix T. Sheltra of Biddeford, Maine, wanted to enjoy the water from a hidden spring that he knew as a boy. It was somewhere under his house. Daniel Marston, the town water-finder, located it. "Right there," said he, and down they dug and drilled through a concrete floor, loam, hard-pan sand 35-1/2 inch strata of rock, a total of 20 feet. Down went the line and, sure enough, a hand pump started the flow of water.

By the next morning water was flowing freely. A Uniflow shallow well water system was installed and soon the same water that Mr. Sheltra enjoyed as a boy was on tap in his home.

Then the big flood came, which did so much damage in New England last spring, and the local water supply was unfit for drinking. Mr. Sheltra set up a water station in his front yard and a battery of faucets were kept busy dispensing free water to the towns people of Saco and Biddeford at the rate of 3,000 gals a day, for 18 hours a day.







### The Author Remembers

The author remembers the development of the water system where he grew up.

At first before electricity was available there was a deep well pump about 50 feet from the house. We pumped the water by hand and carried it to the house in 5 gal cream cans (these were the same shape as a 10 gal milk can). In the kitchen we filled the reservoir mounted on the side of a large wood burning range. This provided warm water after the fire had been going for a hour or two.

The pump had a connection to an underground pipe to the milkhouse. The water when pumped flowed by gravity and entered a wood trough that held 2 ten gallon milk cans. The water filled the cooling trough and left through the overflow pipe to the drinking trough in a barn yard. Considerable pumping was necessary to keep a flow of cold water flowing through the cooling trough to cool the milk and provide drinking water for the cows.

The next step was a 5 horse power gas engine which was belted to a pump jack. The belt of course kept coming off, but then you had to take it off anyway to crank the engine to start it. This was an old "one lunger" with make and break ignition for speed regulation. Sometimes it was more work to start the engine than to pump the water!

### Electricity came in 1928.

When electricity was available, a motor was obtained. The motor was belted to a large flywheel of the gas engine and the engine belted to the pump jack. The piston and timing gears were disconnected to eliminate drag on the motor. The function of the old gas engine was just a speed reducer which was necessary because the pump jack was not geared down enough.

So with the motor driving the engine, and the engine driving the pump jack, there were two belts to come off whenever you tried to start it.







About this time a 100 gallon tank was mounted high on the back porch with a pipe running to the pump. This provided gravity flow cold water to the house. This was a forerunner to a complete system, but in retrospect there was water in the milkhouse and the barn and barnyard even though by gravity, years before there was any running water in the house.



